

BIOLOGY 460 ECONOMIC BOTANY Fall 2011
Life Science-South Room 270 Lecture: TTh 1-2 pm, Lab: Th 2-4:40 pm
 Dr. Michael G. Simpson, Instructor (Office LS 268; office hours by appointment)
 San Diego State University
 (Revised 8/11/2011)

The objective of this course is to provide a knowledge of basic botany, teach specific information about economically important plants, and instill skills in critically researching a topic on an economically important plant. Specific objectives include:

1. understanding the facets of taxonomy: description, identification, nomenclature, and classification.
2. understanding basic plant morphology, anatomy, and growth.
3. knowing the major vegetable, fruit, herb, and spice plants.
4. understanding the concepts and techniques of plant breeding and genetic engineering.
5. knowing the uses of wood and fiber plants and plant extracts.
6. learning the historical and present uses of medicinal and euphoric plants.
7. knowing the economic uses of algae and fungi.

Students will be assessed for the above skills by quizzes, tests, lab practicals, and a major written and oral project.

Expectations

I expect and hope that you'll get two things out of this course: 1) improve your skills in memory, observation, writing, discussion, and thinking; and 2) gain a really good knowledge of plants, both for personal enjoyment and as a background for future courses or graduate work in biology.

Classroom Etiquette

Please arrive to class on time for class, 1:00 pm, and plan to stay for the full period of the class, until 4:40 pm. (If you are late, come in and sit down while I'm talking.) **Turn off your cell phones for the entire duration of class!** (You may check messages between lecture and lab in the hallway or outside only.) Discussion in class is expected and encouraged, but always interact with me and other students in a respectful and civil manner. You may feel free to talk to one another during lab period about class issues, but keep personal conversations to a minimum; most people, including me, require quiet to focus on something. Feel free to go to the restroom at any time; just try to avoid doing so during the first lecture hour and during exams. Always clean up your area completely at the end of class; use the hand brush as needed.

Schedule

Day	Date	Lecture Topic	Laboratory
T	Aug 30	Introduction; plant morphology & taxonomy	
Th	Sep 1	Plant morphology & taxonomy	Lab #1: Plant morphology & taxonomy; keying; 10 spp.
T	Sep 6	Plant anatomy	
Th	Sep 8	Plant anatomy & physiology	Lab #2: Plant anatomy
T	Sep 13	Vegetable plants	
Th	Sep 15	Flowering plants	Lab #3: Vegetables; flowers; Asterac.; Brassicac.
T	Sep 20	Fruits and seeds	
Th	Sep 22	Fruits and seeds	Lab #4: Fruits & seeds
T	Sep 27	Spices	
Th	Sep 29	Herbs; Essential oils, fragrances, perfumes	Lab #5: Apiac., Lamiac. Spices & Herbs; Essential oils
Sa	Oct 1	Sat. Fieldtrip: San Diego Botanic Garden, 9 am - 12:00 noon	
T	Oct 4	Review; Paper Topic Due!	
Th	Oct 6	Lab Practical #1 & Exam #1 (material from 30 Aug - 1 Oct)	
T	Oct 11	Genetics; plant breeding, cultivars	
Th	Oct 13	Genetic engineering; propagation	Library Research
T	Oct 18	Origin of agriculture; cereal grains: wheat & barley	
Th	Oct 20	Cereal grains: corn & rice; pseudocereals; Bibliography Due, with copies of 2 journal articles!	Lab #6: Grains (Poaceae)

T	Oct	25	Alcoholic beverages	
Th	Oct	27	Stimulating beverage plants; legumes; Writing Exercise.	Lab #7: Beverage plants; Legumes (Fabaceae)
Sa	Oct	29	Sat. Fieldtrip: Gordon Biersch Brewery, 11am - ca. 12 noon	
T	Nov	1	Wood anatomy	
Th	Nov	3	Wood & paper products	Lab #8: Wood, paper, forensics
T	Nov	8	Fiber plants	
Th	Nov	10	Fiber plants; plant extracts; Rough Drafts Due!	Lab #9: Fiber Plants
T	Nov	15	Review	
Th	Nov	17	Lab Practical #2 & Exam #2 (material from 11 Oct - 10 Nov); Rough Drafts Returned!	
T	Nov	22	Plant Extracts	
Th	Nov	24	Thanksgiving Holiday	
T	Nov	29	Medicinal plants; class survey	
Th	Dec	1	Medicinal and psychoactive pls.; fumitories, masticatories; Final Papers Due!	Movie; class survey results; Lab#10: Extracts, Medicinal Pls., Masticatories, Fumatories
T	Dec	6	Oral Presentations: 1:00 - 3:00 pm (if possible)	
Th	Dec	8	Oral Presentations: 1:00 - 4:40 pm	
Th	Dec	15	Final Exam: 1:00 - 3:00 pm	

Recommended references: (on reserve in library)

- Lewis, W. H., and M. P. F. Elvin-Lewis. 2003. Medical botany: plants affecting human health. 2nd edition. J. Wiley, Hoboken, N.J.
- Pollan, M. 2001. The botany of desire: a plant's eye view of the world. Random House, New York.
- Simpson, B.B. & M. Conner-Ogorzaly. 2001. Economic Botany: Plants in our World. McGraw-Hill.
- Schery, R. W. 1972. Plants for man, 2nd edition. Prentice-Hall, Englewood Cliffs, N.J.

Quizzes & Exams:

Several "iQuizzes" (open book/note) will be given using the web software "Blackboard." Please register at: <https://blackboard.sdsu.edu> You will need to a RED I.D. number and a password. Follow the instructions on Blackboard. You will generally have a 1-week period to take each of these iQuizzes. Students are responsible for checking their iQuiz grades to ensure that these were recorded during the period of time that the iQuizzes are open. If any errors occur in recording your grade for an iQuiz, immediately contact the Blackboard help line or, as a last resort, your instructor. Otherwise, you will forfeit these points. (Note: I recommend that you have a sound email address. It might be a good idea to start an email account through SDSU. In the past, some students emails consistently "bounced back," interfering with communication. This is increasingly important these days for other courses as well.)

In addition, in-class Quizzes (not open book/note) will be given throughout the semester, generally on every Tuesday. The lowest quiz score of the in-class Quizzes will be dropped. No makeups of quizzes or exams will be given without a physicians note or other documentation in an emergency. **No electronic devices (incl. iPods, CD players, calculators, cell phones, etc.) may be used/worn during any exam! No open computers during class (distraction).**

Grading:

iQuizzes	5%
In-Class Quizzes	10%
Lab Practical #1	10%
Lecture exam #1	15%
Lab Practical #2	10%
Lecture exam #2	15%
Term paper	15%
Presentation	5%
Final Exam	<u>15%</u>
Total:	100%

Letter grades will be assigned according to standard categories: A = 93-100%; A- = 90-92.9%; B+ = 87-89.9%; B = 83-86.9%; B- = 80-82.9%; C+ = 77-79.9%; C = 73-76.9%; C- = 70-72.9%; D+ = 67-69.9%; D = 63-66.9%; D- = 60-62.9%; F = <60%.

Plant of the Week

There will be one species of plant each week which you will be required to learn, both the scientific name, common name, family, identifying characteristics, and economic importance. Information about these plants of the week may be asked in quizzes or exams.

Fieldtrips: There will be two required Saturday fieldtrips in the course. Make ups may not be possible.

Lab attendance, including fieldtrip(s) is mandatory! (Illnesses are excused only with a written physician's note indicating the nature of your illness and why you missed class because of it. Unforeseen emergencies also require documentation.)

- 1 lab missed = 2 percentage points subtracted from final grade
- 2 labs missed = 5 percentage points subtracted from final grade
- 3 labs missed = failure of course

Term paper

A written term paper is required of all students. A rough draft (in good shape) will be due several weeks prior to the final draft of the term paper (see syllabus). A late or poorly prepared rough draft automatically reduces final grade of term paper by 10%. The purpose of the rough draft is to allow the students and me to make corrections and suggestions on the format, content, and writing style of your paper. These corrections will not influence your final grade; only the final paper will be graded. We will use a rubric to evaluate the quality of your papers (to be discussed).

The term paper should be a summary of a plant (rarely an alga or fungus) of economic value to humans, emphasizing the botany (taxonomy, life history, morphology/anatomy) of the plant and discussing economic and historical significance. In some cases, for example the major cereal crops, the topic may need to be limited in scope (e.g., "Corn" is too broad a topic; narrow it to, e.g., "The early development of hybrid corn." Economic plants of limited use, for example one of the species of spices, should be selected with caution, as enough literature may not be available.

A non-exhaustive list of possible plants is: Apple (*Malus pumila*), Artichoke (*Cynara scolymus*), Avocado (*Persea americana*), Banana (*Musa* spp.), Barley (*Hordeum vulgare*), Bean (*Phaseolus vulgaris*), Breadfruit (*Artocarpus altilis*), Cabbage (*Brassica oleracea*), Capsicum Pepper (*Capsicum* spp.), Cashew (*Anacardium occidentale*), Cassava (*Manihot esculenta*), Cocoa (*Theobroma cacao*), Coconut (*Cocos nucifera*), Coffee (*Coffea arabica*), Cotton (*Gossypium* spp.), Date (*Phoenix dactylifera*), Echinacea (*Echinacea* sp.), Fig (*Ficus carica*), Ginkgo biloba (*Ginkgo biloba*), Goldenseal (*Hydrastis canadensis*), Grape (*Vitis* spp.), Mushrooms (e.g., *Agaricus bisporus*), Nutmeg & Mace (*Myristica fragrans*), Oat (*Avena sativa*), Olive (*Olea europaea*), Onion (*Allium cepa*), Orange (*Citrus aurantium*), Peanut (*Arachis hypogaea*), Peach (*Prunus persica*), Pepper (*Piper nigrum*), Peyote (*Lophophora williamsii*), Pineapple (*Ananas comosus*), Pomegranate (*Punica granatum*), Opium Poppy (*Papaver somniferum*), Potato (*Solanum tuberosum*), Rye (*Secale cereale*), Sugar Cane (*Saccharum officinarum*), Taro (*Calocasia esculentum*), Tea (*Camellia sinensis*), Tomato (*Lycopersicon esculentum*), Tobacco (*Nicotianum tabacum*).

Some students may prefer a more general topic, such as "Plant Aphrodisiacs," "Hallucinogenic plants/mushrooms," "The Scientific Basis for Medicinal Uses of Goldenseal," or "The Use of Plants as Dyes."

The paper should be typed [1.5 spaced (18pt); Times 12 font; 1" page margins], 6-8 pages (not including Lit. Cited or figures). All literature sources should be cited in the text (e.g., as "(Smith, 1973)") and in a **Literature Citation** section at the end of the paper. Primary sources of information include books and the journal Economic Botany (and references cited therein), but other scientific journals such as medical journals, National Geographic, and Natural History may be used. In addition to what is in the library, sources may be available from the instructor. Only cite and use articles that are pertinent to your topic, not just those that happen to cover some aspect of your plant species. Web sources may not be used as primary sources of information. Web databases (e.g., Biosis, Google Scholar <<http://scholar.google.com>>) should certainly be used to locate primary sources.

Create an interesting but pertinent title for your paper. For example, not "Tobacco" but something like "The history, sociology, and addictive properties of tobacco (*Nicotiana tabacum*)."

Cite literature sources according to the following format:

Journal articles:

Thomas, G. T. and G. M. Kraskoff. 1994. The history and economic importance of flax (*Linum ussitatissimum*). Economic Botany 144: 123-147.

Book:

Chandler, K. 2004. The families and genera of vascular plants. *Cannabis*, p. 43-44. Springer, Berlin.

Book chapter within an edited book:

Wilkes, J. H. 1987. Peyote. In: Smith, K. (ed.), The economic uses of cacti. Pp. 300-312. Springer, Berlin.

Web site: (generally may not be used as original sources, only approved by me)

Stevens, P.F. 2001. Medicinal uses of goldenseal (*Hydrastis canadensis*). <<http://www.ama.org/herb0354/index.html>>.

Here are some basic guidelines:

1. The subject of the paper needs to be approved by me. Some topics are not appropriate or may not have enough literature sources available.
2. The paper needs to be an objective (as scientific as possible) study of the subject.
3. While the paper should be technical enough to deal with the subject in an effective way, the paper should be readable to most educated people.
4. A MINIMUM of 6 references will be required but more may be necessary to properly document the paper. At **least 2** of these must be scientific journal articles. You may use the three references listed above (**Recommended references, although Pollan 2001 is very limited in scope**); these will be placed on reserve in the library. Your list of references must demonstrate that you have done a thorough bibliographic search. You should give a citation every time your work draws from a source, or at the end of a paragraph all coming from that work. Many good references, well understood, cited, and integrated, will greatly improve your paper.
5. Web sites may not be used as sources of information and may not be cited (with rare exceptions, to be approved by me).
6. Use quotes sparingly, if at all, because they take space. Paraphrase instead. Do not plagiarize!
7. The total length of text is 7-8 pages (not including a separate title page), with 1" margins, Times 12 font, and double-spacing. I suggest that you finish writing early enough (perhaps a week) so as to give yourself time to digest the subject material. Then, read and edit (with pen in hand) a hard-copy of your paper and you will likely see many ways to improve and "tighten" it.
8. You may add figures (maps, diagrams and photos) or tables to go beyond the required 7-8 pages after the Literature Cited. Make sure that each figure has an underlying figure caption, listing what it is and the source (which must be included in your "Literature Cited"). Each figure or table must be referred to at least once in the text. Figures and tables are placed within the paper on a page immediately after they are mentioned in the text.
9. Normal rules of writing, spelling, and grammar apply.
10. No papers will be accepted after the deadline.
11. We will be doing a few in-class exercises and using a rubric to evaluate the paper. You may use this as a guide in writing it, and members of the class will use it in proofing your paper.

Oral Presentation

An oral presentation, **using M.S. Powerpoint** of the research project will be required of all students on the last day of class (following the lab practical). The oral presentation is to last no longer than 10 minutes. Its purpose is simply to acquaint everyone in the class with the interesting and pertinent discoveries you have made. This oral presentation will be graded by a rubric the class decides upon!

"I rank (botany) with the most valuable sciences, whether we consider its subjects as furnishing the principal subsistence of life to man and beast, delicious varieties for our tables, refreshments from our orchards, the adornments of our flower-borders, shade and perfume of our groves, materials for our buildings, or medicaments for our bodies." --Thomas Jefferson

"Question: What advantages are to be derived from the study of botany?

Answer: the study of this science as an amusement is both healthful and pleasing, as it attracts us often into the country, and makes us acquainted with the wonderful works of nature: it also enlarges the mind, by implanting new and useful ideas, and fills it with the most exalted admiration of the great Creator of the universe." From: Irving, C. 1829. A catechism of botany. 3rd American ed. Collins and Hannay, New York. 82 pp.